

CLAIMS

What is claimed is:

1. A method of forming a pore in a laminated material, comprising:
5 forming a laminate preform including a plurality of layers of material;
disposing a member at least partially through said laminate preform;
processing said laminate preform to form a substantially laminated
structure; and
destroying the member in the laminated structure;
10 wherein destroying the member is accomplished with at least one of
substantially little oxidation and degradation to the laminated materials.

2. The method of claim 1, wherein forming a laminate preform includes;

5 selecting the plurality of layers of material to include a substantially non-oxide material; and
selecting a physical property of the material.

3. The method of claim 1, wherein disposing a member through said laminate preform includes:

10 positioning the member through said layers of material in a selected manner.

4. The method of claim 3, wherein disposing a member through said laminate preform includes:

15 selecting a member having a desired profile such that a pore left in said laminated structure by said member creates a substantially uni-directional flow of a flowable material.

5. The method of claim 3, wherein disposing a member through said laminate preform includes:

20 selecting a plurality of members to provide a selected porosity in said laminated structure when the plurality of members are removed from said laminate structure.

25 6. The method of claim 1, wherein laminating said laminate preform includes:

infiltrating said laminate preform with a laminating material to substantially laminate the laminate preform.

30 7. The method of claim 1, wherein destroying the member in the laminated structure includes:

removing the members by at least one of etching, sublimation, and melting.

8. The method of claim 1, further comprising:
forming a plurality of pores in said laminated structure; and
disposing said porous laminated structure operably adjacent a
5 structure to transpirationally cool said structure.
9. The method of claim 1, further comprising:
forming a plurality of pores in said laminated structure; and
forming a hot wall of said laminated structure;
10 wherein a coolant is able to flow through said pores to cool said hot
wall.
10. The method of claim 1, further comprising:
forming a pore having at least one of a selected size, shape,
15 dimension, and property.

11. A method for forming a laminate material including a selected pore, comprising:

selecting a substantially oxide-free fabric;

5 forming a fabric stack including at least one layer of said selected substantially oxide-free fabric to be laminated into a substantially coherent laminate structure;

placing a pin into the fabric stack;

laminating the fabric stack such that the fabric stack becomes laminated into a laminated structure; and

10 removing the pin from the laminated structure to form a substantially selected pore in the laminated structure.

12. The method of claim 11, wherein selecting a substantially oxide-free fabric includes;

5 selecting a material from the group including: carbon fiber, silicon carbide fiber, polymeric fibrous materials, and combinations thereof.

13. The method material of claim 11, wherein forming a fabric stack includes:

10 disposing at least a first substantially oxide-free fabric layer substantially adjacent a second substantially oxide-free fabric layer; and

wherein said first layer and said second layer are positioned in a selected orientation for forming the laminated structure.

14. The method of claim 13, wherein placing a pin into the fabric stack includes:

moving the pin through each of the layers of the fabric stack without substantially disrupting the selected orientation of each of said layers.

15. The method of claim 11, wherein placing a pin into the fabric stack includes:

20 moving a pin through fabric stack such that the pin is disposed through selected layers of said fabric stack.

16. The method of claim 11, wherein removing the pin from the laminate stack includes:

25 etching the pin by dissolving the pin with a selected liquid that removes the pin from the laminated structure while the laminated structure retains substantially all its properties.

17. The method of claim 11, wherein removing the pin from the laminate structure includes:

heating the pin to a selected temperature such that the pin
5 becomes substantially structurally incoherent and is removed from the laminated structure; and

wherein removing the pin from the laminated structure leaves the laminated structure substantially intact.

10 18. The method of claim 11, wherein placing a pin into the fabric stack includes:

placing the pin through a selected layer of said plurality of layers according to a selected pattern.

15 19. The method of claim 11, wherein placing a pin into the fabric stack includes:

placing a pin having a selected profile such that said selected pore remaining in said laminated structure allows for substantially uni-directional flow of a flowable material through the laminated structure.

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20. The method of claim 11, wherein placing a pin into the fabric stack includes:

placing a pin at a selected angle such that said selected pore remaining in said laminated structure allows for substantially uni-directional flow
25 of a flowable material through the laminated structure of said selected angle.

21. A method of forming a structure including a substantially selected porosity, the method including:

selecting a plurality of substantially non-oxide fabrics layers;

5 forming a fabric stack by disposing said selected plurality of substantially non-oxide fabric layers adjacent one another;

positioning a plurality of pore forming members into said fabric stack in a selected arrangement;

processing said fabric stack to form a laminated structure with said plurality of pore forming members disposed therein; and

10 removing said plurality of pore forming members while leaving substantially intact said laminated structure;

wherein when said plurality of pore forming members are removed a plurality of selected pores remain in said laminated structure.

22. The method of claim 21, wherein processing said fabric stack to form a laminate includes:

substantially infiltrating said fabric stack with a laminating material
5 that generally integrates said fabric stack such that each layer of said fabric stock becomes generally integrated;

wherein said laminating material is substantially non-reactive with said plurality of pore forming members.

10 23. The method of claim 21, wherein positioning said plurality of pore forming members into said fabric stack includes:

selecting said plurality of pore forming members and arranging them in a selected pattern relative to said fabric stack; and

moving said plurality of pore forming members through said fabric
15 stack such that said plurality of pore forming members are substantially disposed within said fabric stack.

24. The method of claim 21, wherein removing said plurality of pore forming members includes:

20 etching said plurality of pore forming members from said laminated structure while substantially maintaining a physical property of said laminated structure.

25 25. The method of claim 21, wherein removing said plurality of pore forming members includes:

heating said plurality of pore forming members such that said plurality of pore forming members are substantially removed from said laminated structure;

wherein said laminated structure is substantially intact after
30 removing said plurality of pore forming members.

26. A method of forming a laminated panel having a plurality of unidirectional pores, comprising:
- forming a laminate preform including a plurality of layers of material;
 - disposing a plurality of pore forming members in said laminate
- 5 preform in a selected pattern;
- processing said laminate preform to form a laminated structure; and
 - abolishing the pore-forming members in the laminated structure to form a plurality of unidirectional pores in said laminated structure.

27. The method of claim 26, wherein forming a laminate preform includes selecting a material including substantially oxide-free materials.

5 28. The method of claim 26, wherein processing said laminate preform includes forming said laminated structure around said pore forming members.

29. The method of claim 26, wherein abolishing the pore-forming members includes substantially removing said pore-forming members from said
10 laminated structure substantially after said laminated structure is formed from said laminate preform.

30. The method of claim 26, wherein abolishing the pore-forming members includes at least one of:

15 heating said pore-forming members in said laminated structure to melt said pore-forming members from said laminated structure; and
etching said pore-forming members from said laminated structure.

31. A high strength panel providing a desired degree of porosity,
comprising:

a laminated substrate including a plurality of independent layers of
material placed adjacent one another;

5 a plurality of pores formed in said laminated substrate by the
placement of a plurality of pore forming members in at least a selected one of
said plurality of independent layers of material prior to forming said laminated
substrate; and

10 wherein said plurality of pore forming members are held in said
selected plurality of independent layers of material until said laminated substrate
is fully formed and then destroyed in said laminated substrate to form said pores.